In particular, it is not important, whether this invention is applied to an audio encoder which includes a transforming step and a coding step, or whether the invention is applied to a kind of a "transcoder," in which the invention is applied to already existing code words which are, for example, written in a format, which is not error-resilient. As outlined in the paragraph bridging pages 6 and 7 of the English translation of the application as originally filed, it is outlined that inventive advantages are obtained by determining the raster, defining priority code words, and positioning the priority code words in the raster. No transforming and encoding steps are necessary, but can, of course, be applied before the inventive steps.

Additionally, reference is made to pages 7 and 8 of English language translation of the application as originally filed. In all these different embodiments, which are summarized here, it is outlined that the inventive advantage is obtained by determining the raster, defining priority code words and positioning the priority code words without having regard to the fact, whether the code words are transformed and encoded immediately before putting them into the raster, or whether the step of determining the raster etc. is performed based on already existing code words written in an error-sensitive format.

Claim 9 has been adapted to the different wording of Claim 1 and is based on the same original disclosure as has been mentioned with respect to Claim 1.

The same is true for the apparatus Claims 21 and 22.

With respect to the decoder claims, the same original support as discussed in connection with the encoder claims applies. Additionally, reference is made to the amendment in the third paragraph of Claim 23 or Claim 25. This amendment is supported by the first paragraph of page 20 of the English language translation of the original application, where the alternative is mentioned that, after reading the priority code words, all code words are already arranged linearly with frequency. Naturally, in case this linear arrangement is already present, no further resorting has to be performed.

New Claims 27 to 30 are supported by the first paragraph of page 16 of the application as originally filed.

CONCLUSION

In view of the above, the Application is deemed to be in condition for allowance. Therefore, the Examiner is earnestly solicited to withdraw all rejections and allow the Application to

pass to issue as a U.S. Patent. Should the Examiner have any questions concerning the application, he is urged to contact the Applicant's attorney at Michael A. Glenn, (650) 474-8400.

Respectfully submitted,

Michael A. Glenn
Reg. No. 30,176

Customer No. 22862

Claims

1. (Currently Amended) A method for coding an audio signal to obtain a coded bit stream, ~~comprising the following steps:~~wherein the bit stream includes code words created by ~~(a)~~ transforming a block of discrete-time samples of the audio signal into the frequency domain to obtain a block of spectral values which represent the audio signal; ~~(b)~~and coding the spectral values with a code table having a limited number of code words of different length to obtain spectral values coded with code words, the length of a code word which is assigned to a spectral value generally being that much shorter the higher the probability of occurrence of the spectral value is~~;~~, comprising the following steps:

~~(c)~~ determining a raster for the coded bit stream where the raster has equidistant raster points ~~(10, 12, 14)~~ and where the separation ~~(D1)~~ of the raster points depends on the code table;

a1

~~(d)~~ defining priority code words among the code words, those code words which represent spectral values which are psychoacoustically important compared to other spectral values being defined as priority code words;

~~(e)~~ positioning the priority code words in the raster so that the start of a priority code word which represents a spectral value of the block of spectral values coincides with one raster point and the start of another priority code word which represents another spectral value of the block of spectral values coincides with another raster point.

2. (Original) A method according to claim 1,

wherein a plurality of windows is used, whereby a plurality of sets of spectral values results, where each set of spectral values comprises the complete spectrum; and

wherein, in the step of defining priority code words, those code words which code spectral values of the same frequency from the respective sets are defined to be priority code words.

3. (Currently Amended) A method according to claim 1~~ or 2~~, wherein a code word of the code table codes a plurality of spectral values, the spectral values being combined into groups or units in such a way that the number of spectral values in a group is divisible by the plurality of spectral values which a code word codes.

a1

4. (Original) A method according to claim 3, wherein various code tables with different dimensions, i.e. spectral values per code word, are used, a unit having n spectral values, where n is a common multiple of all the dimensions which occur.

5. (Currently Amended) A method according to~~ one of the claims 1 to 3~~ claim 1, wherein, in the step of defining priority code words, the code words which code the spectral values of the sets of spectral values which are assigned to low frequencies are defined to be priority code words.

6. (Original) A method according to claim 5, wherein the step of defining priority code words includes the following step:

placing the code words in sequence in a sort table, priority code words being code words in the front part of the sort table and therefore more likely to be po-

sitioned on raster points than code words further back in the table, in such a way that the sequence of code words in the sort table constitutes a priority distribution within the code words, thus producing priority code words; and

wherein the step of positioning the priority code words includes the following step:

successive positioning of the code words from the sort table on raster points until no raster points are left;

positioning the remaining code words from the sort table at locations in the raster which are still unoccupied.

7. (Currently Amended) A method according to ~~one of the preceding claims~~ claim 1, wherein, in the step of defining priority code words, the code words which code spectral values with low frequency and/or high energy are defined to be priority code words.

8. (Currently Amended) A method according to ~~one of the preceding claims~~ claim 1, wherein the distance between the raster points is somewhat smaller than, equal to or greater than the longest code word of the code table or is equal to or greater than the longest code word actually appearing in the bit stream.

9. (Currently Amended) A method according to claim 1, wherein ~~the following steps are performed~~ before ~~the step of~~ coding the spectral values~~:~~ grouping the spectral values into adjacent spectral sections is performed, each spectral section having at least one spectral value~~;~~—, and further assigning at least two different code tables from a predetermined number of code tables to two different spectral sections is per-

formed, a spectral section having assigned to it that code table which is best suited for coding the spectral values in the spectral section~~;~~,

wherein, in ~~the step of~~ coding, the spectral values from the spectral sections are coded with the code table which is assigned to the corresponding spectral section; and

wherein, in the step of specifying, a raster is specified for the coded bit stream such that the raster has at least two groups of raster points ~~(10, 12, 14 and 14, 16, 18)~~, such that the raster points of each group are spaced equidistantly from one another and such that the raster point distance ~~(D1 or D2)~~ of each group depends on an appropriate code table from among the at least two different code tables.

10. (Original) A method according to claim 9, wherein, in the step of
defining priority code words, a code word is defined to be a priority code word when an indicator, which depends on the code table from which the code word originates, indicates priority.

11. (Original) A method according to claim 10,

wherein each code table has a maximum absolute value for a spectral value which is to be coded; and

wherein the indicator indicates the highest priority when the code table on which the indicator depends has the highest absolute value of all the code tables.

12. (Currently Amended) A method according to ~~one of the claims 9 to 11~~ claim 9,

wherein each code table has a maximum absolute value

for a spectral value which is to be coded; and

wherein a plurality of code tables is used, where there is an indicator for each table, where the indicator is determined by the highest absolute value of the respective table and where the indicator for a table with a greater maximum absolute value indicates a higher priority for a code word from the table than does an indicator for another table with a smaller maximum absolute value.

13. (Currently Amended) A method according to ~~one of the claims 9 to 12~~ claim 9, wherein the raster point distance ~~(D1, D2)~~ of each group of raster points is smaller than, equal to or greater than the length of the longest code word of the corresponding code table.

a1

14. (Currently Amended) A method according to ~~one of the claims 9 to 12~~ claim 9, wherein the raster point distance ~~(D1, D2)~~ of each group of raster points is equal to the length of the longest actually occurring code word for a spectral value in the corresponding spectral section; and

wherein the length of the longest actually occurring code word of a spectral section is transmitted as side information to the bit stream.

15. (Currently Amended) A method according to ~~one of the claims 9 to 12~~ claim 9, wherein the raster point distance of a group of raster points is so determined as to be equal to the minimum of the longest actually occurring code word of all the grouped spectral sections and the longest code word of the code table of this group, and where the longest actually occurring code word is transmitted to a decoder as side information.

16. (Currently Amended) A method according to~~ one of the preceding claims~~ claim 1, wherein a substantially linear arrangement of the code words with frequency is adhered to in the raster of the bit stream both for the priority code words and for the non-priority code words.

17. (Currently Amended) A method according to~~ one of the claims 1 - 15~~ claim 1, wherein the code words which represent coded spectral values are arranged in the raster of the bit stream independently of the frequency of the corresponding spectral values.

a1

18. (Currently Amended) A method according to claim 17, wherein information regarding the correspondence between the frequency and the code word is inserted in the bit stream as side information when the frequency independent distribution is not predetermined.

19. (Currently Amended) A method according to claim 1~~ or claim 9~~, wherein only each n-th code word of the priority code words is arranged in the raster of the bit stream while the remaining priority code words and non-priority code words are not aligned with raster points.

20. (Currently Amended) A method according to~~ one of the preceding claims~~ claim 1, wherein the spectral values are quantized prior to coding taking the psychoacoustic model into account.

21. (Currently Amended) A device for coding an audio signal to obtain a coded bit stream, wherein the bit stream includes code words created by ~~comprising: (a) a unit for ~~transforming a block of discrete-time samples of the audio signal into the frequency domain to obtain a block of spectral values which represent the audio signal~~;~~ and ~~(b) a unit for ~~coding the spectral

values with a code table having a limited number of code words of different lengths to obtain spectral values coded with code words, the length of a code word which is assigned to a spectral value generally being that much shorter the higher the probability of occurrence of the spectral value is~~;~~,comprising:

~~(c)~~ a unit for determining a raster for the coded bit stream where the raster has equidistant raster points ~~(10, 12, 14)~~ and where the separation ~~(D1)~~ of the raster points depends on the code table;

~~(d)~~ a unit for defining priority code words among the code words, those code words which represent spectral values which are psychoacoustically important compared to other spectral values being defined as priority code words; and

~~(e)~~ a unit for positioning the priority code words in the raster so that the start of a priority code word which represents a spectral value of the block of spectral values coincides with one raster point and the start of another priority code word which represents another spectral value of the block of spectral values coincides with another raster point.

22. (Currently Amended) A device according to claim 21, ~~also comprising: a unit for~~ wherein before transforming grouping the spectral values into adjacent spectral sections, each spectral section having at least one spectral value~~;~~, and ~~a unit for~~ assigning at least two different code tables from a predetermined number of code tables to two different spectral sections, a spectral section having assigned to it that code table which is best suited for coding the spectral values in the spectral section~~;~~, is performed,

where ~~the unit for~~in coding ~~is designed to code~~ the

spectral values from the spectral sections are coded with the code table which is assigned to the corresponding spectral section;

where the unit for specifying is designed to specify a raster for the coded bit stream such that the raster has at least two groups of raster points~~ (10, 12, 14 and 14, 16, 18)~~, such that the raster points of each group are spaced equidistantly from one another and such that the raster point distance ~~(D1 or D2) ~~of each group depends on an appropriate code table from among the at least two different code tables

a1

23. (Currently Amended) A method for decoding a bit stream representing a coded audio signal, where the coded bit stream contains code words of different lengths from a code table and has a raster with equidistant raster points~~ (10, 12, 14)~~, where the code words include priority code words, which represent particular spectral values of a block of spectral values which are psychoacoustically important compared to other spectral values, where the block of spectral values represents a spectrum of a block of temporal samples of the audio signal, and where priority code words are aligned with raster points so that the start of a priority code word representing a spectral value of the block of spectral values coincides with one raster point and the start of another priority code word representing another spectral value of the block of spectral values coincides with another raster point, comprising the following steps:

~~(a) ~~detecting the distance ~~(D1) ~~between two adjacent raster points; and

~~(b) ~~reading out or, in the case of a non-linear arrangement with frequency, resorting the priority code words, which are aligned with the raster points, in

the coded bit stream in such a way as to obtain a linear arrangement of the same with frequency, the start of a priority code word coinciding with a raster point~~; (c)~~so that by decoding the priority code words with an associated code table to obtain decoded spectral values~~;~~ and ~~(d)~~by transforming the decoded spectral values back into the time domain ~~to obtain~~ a decoded audio signal is obtainable.

24. (Currently Amended) A method according to claim 23, wherein the coded bit stream contains code words of different lengths from at least two code tables and has a raster with at least two groups of equidistant raster points~~ (10, 12, 14 and 14, 16, 18)~~, including the following step:

identifying the code table associated with a spectral section; and

a1

where, in ~~the step of~~ decoding, the priority code words of a spectral section are decoded with the corresponding associated code table.

25. (Currently Amended) A device for decoding a bit stream representing a coded audio signal, where the coded bit stream contains code words of different lengths from a code table and has a raster with equidistant raster points~~ (10, 12, 14)~~, where the code words include priority code words, which represent particular spectral values of a block of spectral values which are psychoacoustically important compared to other spectral values, where the block of spectral values represents a spectrum of a block of temporal samples of the audio signal and where priority code words are aligned with raster points so that the start of a priority code word representing the spectral value of the block of spectral values coincides with one raster point and the start of another priority code word representing

another spectral value of the block of spectral values coincides with another raster point, comprising:

(a) a unit for detecting the distance ~~(D1)~~ between two adjacent raster points; and

(b) a unit for reading out or, in the case of a non-linear arrangement with frequency, resorting the priority code words, which are aligned with the raster points, in the coded bit stream in such a way as to obtain a linear arrangement of the same with frequency, the start of a priority code word coinciding with a raster point~~;~~, so that by ~~(c) a unit for~~ decoding the priority code words with an associated code table to obtain decoded spectral values~~;~~, and ~~(d) a unit for~~ transforming the decoded spectral values back into the time domain ~~to obtain~~ a decoded audio signal is obtainable.

a1

26. (Currently Amended) A device according to claim 25, wherein the coded bit stream contains code words of different lengths from at least two code tables and has a raster with at least two groups of equidistant raster points ~~(10, 12, 14 and 14, 16, 18)~~, also comprising:

a unit for identifying the code table associated with a spectral section;

where ~~the unit for~~in decoding ~~is designed to decode~~ the priority code words of a spectral section are decodable with the corresponding associated code table.

27. (New) A device for decoding a bit stream, the bit stream having code words of different lengths from a code table and, as side information, information on the length of the longest actually occurring code

word, comprising:

a decoder for decoding the bit stream using the code table, the decoder being operative to detect, whether a code word extracted from the bit stream is longer than the length of the longest actually occurring code word and is, therefore, an erroneous code word, the decoder being further operative to adopt a countermeasure, when such an erroneous code word is detected.

28. (New) A device in accordance with claim 27, in which the decoder is operative to adopt, as the countermeasure, a blanking out or a concealment of the erroneous code word.

29. (New) A device in accordance with claim 27, in which the bit stream represents a coded audio signal, and in which a long code word corresponds to a spectral value of the audio signal having a high energy compared to a comparatively short code word corresponding to a spectral value having a comparatively low energy.

a1

30. (New) A method of decoding a bit stream, the bit stream having code words of different lengths from a code table and, as side information, information on the length of the longest actually occurring code word, comprising:

decoding the bit stream using the code table, the step of decoding including the following substeps:

detecting, whether a code word extracted from the bit stream is longer than the length of the long-

a1

est actually occurring code word and is, therefore, an erroneous code word; and

adopting a coutermeasure, when such an erroneous code word is detected.